(11) Application No. AU 2007201803 B2

(19) AUSTRALIAN PATENT OFFICE

(54) Title

Oven Door

(51)[6] International Patent Classification(s)

F24C 15/02 (2006.01) 20060101AFI2007050

F24C 15/02 7BHAU

(21) Application No: 2007201803 (22) Application Date: 2007.04.23

(30) Priority Data

(31) Number	(32) Date	(33) Country
10-2006-0041051	2006.05.08	KR
10-2006-0036638	2006.04.24	KR

(43) Publication Date : 2007.11.08

(43) Publication Journal Date : 2007.11.08

(71) Applicant(s)

LG Electronics Inc.

(72) Inventor(s)

Bang, Suck Jin

(74) Agent/Attorney

Freehills Patent & Trade Mark Attorneys, Level 38 MLC Centre Martin Place, Sydney, NSW, 2000

(56) Related Art

US D511936 S

US 5819722 A

US 6904904 B2

2007201803 23 Apr 2007

ABSTRACT OF THE DISCLOSURE

An oven door is provided. The oven door frame includes an upper fixture, a lower fixture restricting the parts in load direction, and a middle frame have a distance from the front glass in order to emit the hot air in a space contacting the front glass. In addition, the door-handle-coupling structure includes a through-hole formed in the front glass, a spacer formed on the upper fixture, a screw going through the spacer and the through-hole, and the door handle. Outside air introduced from a bottom of the front glass goes out through a side of a space contacting the front glass and thus cools only the space contacting the front glass. Since the heavy division members are supported by only the lower fixture, the oven door can be easily assembled and disassembled when damaged.

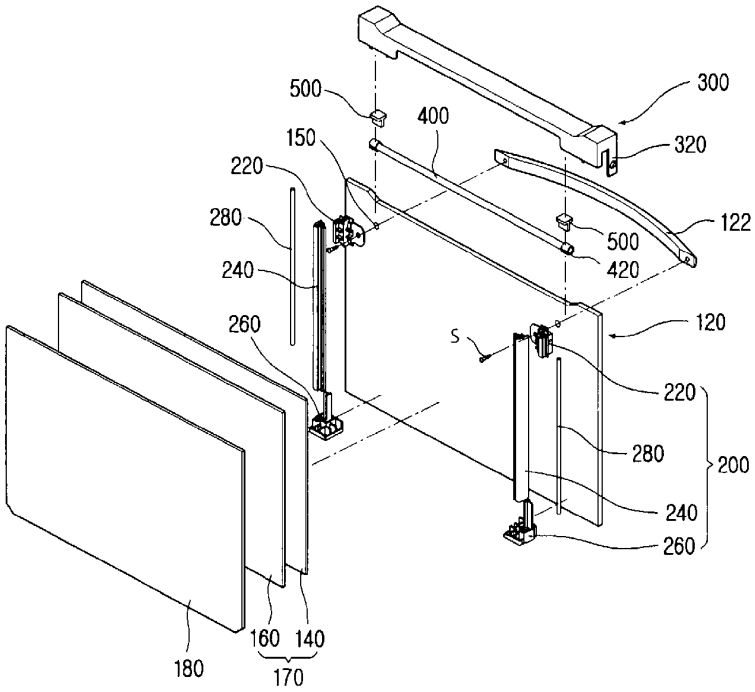
15

THE DRAWING OF REPRESENTATIVE: FIG. 3

39

2007201803 23 Apr 2007

FIG.3



2007201803 23 Apr 2007

P/00/011
Regulation 3.2

AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION
STANDARD PATENT

Invention Title: **Oven Door**

The following statement is a full description of this invention, including the best method of performing it known to us:

2007201803 23 Apr 2007

OVEN DOOR

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an oven door, and more particularly, to an oven door that is easily assembled/disassembled and conveniently used and provides selective insulation or selective cooling according to a coupling position and a coupling distance of each part. The present invention further relates to an oven door that can be applied to various heating apparatuses having a heater and a front hinge door.

Description of the Related Art

[0002] Two common kinds of modern ovens are gas ovens and electric ovens. The electric ovens are cooking apparatuses heating foods using heat generated by various heaters operated by electricity and an apparatus generating high frequency waves after the foods are placed in the ovens. Examples of heaters include ceramic heaters, sheath heaters, and halogen heaters. The electric ovens simultaneously heat the inside and the

2007201803 23 Apr 2007

periphery of food to speed the cooking of the food and increase heat efficiency. In addition, the electric ovens are safe. Therefore, the electric ovens are widely used.

[0003] The electric oven has a cubical shape and formed with a cavity in which food is cooked.

[0004] In addition, a front opening of the oven cavity is selectively shielded by a rotatable oven door. A handle is formed at an upper portion of the oven door.

[0005] The oven door formed in the front side of the oven is formed of a transparent material to allow a user to look into the inside of the oven where food is placed. In addition, the oven door is required to effectively preserve heat generated by the heater, while the oven door is required to reduce the temperature of parts exposed to the outside for convenient and safe use of the oven. In addition, the oven door is required to be easily assembled and disassembled for repairs. However, since the hinge oven door should include a transparent plate and a hinge structure, an oven door having such a hinge oven door is difficult to be conveniently used and assembled/disassembled and provide good insulation.

2007201803 03 Jun 2009

It will be understood that any reference herein to prior art does not constitute an admission as to the common general knowledge of a person skilled in the art.

It will also be understood that the term "comprises" (and grammatical variants thereof) as used herein is equivalent to the term "includes" and should not be taken as excluding the existence of additional features.

SUMMARY OF THE INVENTION

[0006] Accordingly, aspects of the present invention are directed to an oven door or oven that substantially obviates one or more problems due to limitations and disadvantages of the related art.

In one aspect the present invention provide an oven door comprising: a front glass that defines an exterior side of the oven door; a rear glass that defines an interior side of the oven door; a plurality of division members arranged at predetermined intervals between the front glass and the rear glass; a middle frame provided at opposite lateral sides of the plurality of division members, wherein the middle frame is spaced apart from

2007201803 03 Jun 2009

the front glass and encloses the lateral sides of the plurality of division members and the rear glass; first and second lower fixtures attached to lower left and right sides, respectively, of the front glass, wherein the first and second lower fixtures hold and support the division members and the rear glass; a top cover that extends across a top of the front and rear glasses and the plurality of division members; first and second upper fixtures attached to upper left and right sides of the front glass, wherein the first and second upper fixtures operate to maintain a separation distance between the division members; and a door handle coupled to the first and second upper fixtures by fasteners that pass through the front glass.

In a second aspect the present invention provides an oven door comprising a front glass; a door frame coupled to a rear side of the front glass, the door frame having lateral sides that are spaced apart from the rear side of the front glass; at least one division member attached to the door frame, wherein side edges of the at least on division member are coupled to the lateral sides of the door frame; a top cover that covers upper portions of the front glass and the at least one division member;

5

2007201803 03 Jun 2009

an air introduction passage formed at a lower portion of the door such that external air can be introduced into a space formed between the front glass and the at least one division member; an air outlet formed between a front glass and the door frame such that air can be emitted from the space formed between the front glass and the at least one division member; and a door handle coupled to the door frame by fasteners that pass through the front glass.

In a third aspect the present invention provides an oven comprising: a main body having a cooking cavity; a heat producing element; and a door that closes the cooking cavity, wherein the door comprises: a heat-resisting glass that shields heat generated in the cooking cavity; a front spaced apart from the heat-resisting glass; a rear glass spaced apart from the heat-resisting glass; a lower fixture coupled to a lower rear surface of the front glass, wherein lower end portions of the rear glass and the heat-resisting glass are each received in the lower fixture; an upper fixture coupled to an upper rear surface of the front glass and vertically aligned with the lower fixture a middle frame that extends between the upper and lower fixtures,

2007201803 03 Jun 2009

wherein the middle frame covers side edges of the heat-resisting glass and the rear glass, and wherein the middle frame is spaced from the front glass such that gaps formed between the side edges of the heat-resisting glass and the rear glass are covered by the middle frame and a gap formed between the heat-shielding glass and the front glass is exposed; and a door handle coupled to the upper fixture by fasteners that pass through the front glass.

[0007] In a further aspect there is provided an oven door including a plurality of division members arranged in the oven door at predetermined intervals, a front and rear glasses disposed in front and rear of the division members, respectively, and a middle frame disposed at both side end portions of the division members.

[0008] In addition, lower fixtures are formed on both lower side end portions of the front glass, and upper fixtures are formed on both upper side end portions of the front glass. The fixtures support and maintain the division members to have the distances from each other.

2007201803 03 Jun 2009

[0009] In addition, a middle frame covers the both side end portions of the division members, and a top cover covers and fixes the division members.

[0010] In here, inner parts except for fixtures including the division members, the middle frame, and the top cover are just placed on the lower fixture. The inner parts except for the fixtures are easily disassembled by removing the top cover.

[0011] As described above, in the oven door according to aspects of the present invention, air introduced from a bottom of the front glass goes out through a side of a narrow space between the middle frame and the front glass and thus cools the front glass. Therefore, when a user touches the door handle or the front glass, the user is safe from getting a burn.

[0012] As a matter of course, a space contacting the rear glass has no air outlet, and thus insulates the inside of an oven.

[0013] In addition, the oven door according to aspects of the present invention includes the door handle. The door handle minimizes the stress partially exerted on the front glass and is directly connected to the upper fixture. The assembly of the upper fixture, the front glass, and the door handle is more

2007201803 03 Jun 2009

stably performed by a spacer formed on the upper fixture.

[0014] The oven door according to aspects of the present invention insulates the inside of the oven. The air introduced from the bottom of the front glass goes out through the side of the space contacting the front glass and thus cools only the front glass. Since the heavy division members are supported by the lower fixture, the oven door can be easily assembled and disassembled.

[0015] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0017] FIG. 1 is an perspective view illustrating an oven

2007201803 23 Apr 2007

according to an embodiment of the present invention;

[0018] FIG. 2 is a perspective view illustrating an oven door according to an embodiment of the present invention;

[0019] FIG. 3 is an exploded perspective view illustrating an oven door according to an embodiment of the present invention;

[0020] FIG. 4 is an exploded perspective view illustrating a front glass of an oven door according to an embodiment of the present invention;

[0021] FIG. 5 is an exploded perspective view illustrating a door frame of an oven door according to an embodiment of the present invention;

[0022] FIG. 6 is a perspective view illustrating an upper fixture of an oven door according to an embodiment of the present invention;

[0023] FIG. 7 is a partial perspective view illustrating an upper fixture coupled to a front glass of an oven door according to an embodiment of the present invention;

[0024] FIG. 8 is a partial perspective view illustrating a top shield member and a middle frame coupled to an upper fixture, and a reversed top cover of an oven door according to an

2007201803 23 Apr 2007

embodiment of the present invention;

[0025] FIG. 9 is a partial perspective view illustrating a lower fixture coupled to a front glass of an oven door according to an embodiment of the present invention;

[0026] FIG. 10 is a cross sectional view illustrating the disposition of a middle frame, a front glass, a rear glass, and an inside division members of an over door according to an embodiment of the present invention;

[0027] FIG. 11 is a cross sectional view illustrating an upper fixture coupled to a middle frame according to an embodiment of the present invention; and

[0028] FIG. 12 is a cross sectional view illustrating an assembly of a middle frame, a side-sealing member, and a lower fixture according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0029] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0030] FIG. 1 is a perspective view illustrating an oven

2007201803 23 Apr 2007

according to an embodiment of the present invention

[0031] Referring to FIG. 1, the oven includes an inner heater 20, a main body 10, and an oven door 100. The main body 10 includes a control panel 30. The oven door 100 includes a transparent window so as to check the state of a food in the main body 10. The hinge oven door 100 is coupled to the main body 10. A door handle 122 is formed in an upper portion of a front surface of the oven door 100.

[0032] FIG. 2 is a perspective view illustrating the oven door 100 according to an embodiment of the present invention.

[0033] Referring to FIG. 2, the oven door 100 according to the present invention includes a front glass 120, a top cover 300, door frames 200, and a rear glass 180. The front glass 120 makes a front appearance. The top cover 300 formed on an upper portion of a rear surface of the front glass 120 makes a top appearance of the oven door 100. The door frame 200 formed on rear both sides of the front glass 120 supports the front glass 120 and makes a side appearance of the oven door 100. The rear glass 180 fixed by the door frame 200 and the top cover 300 makes a rear appearance of the oven door 100.

2007201803 23 Apr 2007

[0034] The front glass 120 having a tetragonal shape is formed at the most front portion of the oven door 100. The front glass 120 is the main appearance of an oven. Therefore, the front glass 120 is coated for improving the appearance and preventing damages such as scratches. In addition, the door handle 122 is coupled to an upper portion of a front surface of the front glass 120.

[0035] Users hold the door handle 122 to open and close the oven door 100. The door handle 122 is a bar having a convex curvature. In addition, a screw hole 124 is further formed in both ends of the door handle 122 for the assembly using a screw.

[0036] In addition, a through-hole 150 illustrated in FIG. 4 is formed in an upper portion of the front glass 120. A coupling member such as the screw goes through the through-hole 150, and a spacer 222 described below is inserted into the through-hole 150.

[0037] Meanwhile, the door frame 200 is formed on both sides of the front glass 120. The door frame 200 includes three portions and has a long cubic shape to make the side appearance of the oven door 100.

[0038] The door frame 200 includes upper fixtures 220, a

2007201803 23 Apr 2007

middle frame 240, and a lower fixture 260. The upper fixture 220 forms an upper portion of the door frame 200, the middle frame 240 forms a middle portion of the door frame 200, and the lower fixture 260 forms a lower portion of the door frame 200.

[0039] Meanwhile, the rear glass 180 forms a rear surface of the oven door 100.

[0040] The rear glass 180 is formed at the most rear portion of the oven door 100 to contact an oven cavity (not shown) in which foods are cooked. The rear glass 180 is exposed to relatively high heat. Therefore, the rear glass 180 may be coated or specially treated so as to resist heat. Furthermore, a space contacting the rear glass 180 is completely sealed regardless of a space contacting the front glass 120, and thus increases an insulation effect as much as possible.

[0041] FIGS. 3 and 4 are exploded perspective views illustrating the oven door 100 according to an embodiment of the present invention. FIG. 5 is an exploded perspective view illustrating the door frame 200 of the oven door 100 according to an embodiment of the present invention.

[0042] Referring to FIGS. 3 through 5, the oven door 100

2007201803 23 Apr 2007

further includes a division member 170, a top shield member 400, and a couple of space-ensuring members 500. The division member 170 is formed between the front glass 120 and the rear glass 180. The top shield member 400 shields a top side of the division members 170. The space-ensuring member 500 detaches the front glass 120 from the division members 170 to prevent damages from impact.

[0043] In addition, the division member 170 is formed between the door frames 200. The door frames 200 are formed at a left and right portions of the rear surface of the front glass 120, respectively. The division member 170 includes a heat-resisting glass 160 and a middle glass 140. The heat-resisting glass 160 is detached from the rear glass 180 to form a predetermined space. The middle glass 140 formed between the heat-resisting glass 160 and the front glass 120 forms separated spaces between the heat-resisting glass 160 and the front glass 120.

[0044] The top shield member 400 is required to have an excellent insulation performance and excellent strength. For example, the top shield member 400 may be a metal bar. An upper end of the heat-resisting glass 160 of the division members 170

2007201803 23 Apr 2007

is inserted into the top shield member 400 without an additional coupling member. The top shield member 400 further includes a groove (not shown) having a size corresponding to the thickness of the heat-resisting glass 160.

[0045] In addition, an impact absorption material 420 is formed at both ends of the top shield member 400. Referring to FIG. 8, it is intuited how the top shield member 400 is coupled to the heat-resisting glass 160.

[0046] In addition, the space-ensuring member 500 includes a tetragonal plate and a projection. The tetragonal plate and the projection are formed to be a single element. The projection downwardly protrudes from a middle portion of the tetragonal plate. The couple of space-ensuring members 500 have a shape similar to "┬" at a side view. The space-ensuring members 500 are inserted between the middle glass 140 and the heat-resisting glass 160. The space-ensuring members 500 are at left and right portions of the glasses 140 and 160, respectively.

[0047] Meanwhile, the oven door 100 including the parts as described above is assembled using the door frame 200 as a reference part.

2007201803 23 Apr 2007

[0048] Among the parts of the door frame 200, the upper fixture 220 is fixed to the upper portion of the rear surface of the front glass 120 using a coupling member such as a sealant and a screw. The spacer 222 is formed on a portion of the upper fixture 220 contacting the front glass 120. The spacer 222 prevents the front glass 120 from being damaged by impact when the front glass 120 is coupled to the door handle 122 by a coupling member such as a screw. The spacer 222 and the upper fixture 220 are a single element.

[0049] FIG. 6 is a perspective view illustrating the upper fixture 220 of the oven door 100 according to an embodiment of the present invention. FIG. 7 is a perspective view illustrating the upper fixture 220 coupled to the front glass 120 of the oven door 100 according to an embodiment of the present invention.

[0050] FIG. 7 illustrates the upper fixture 220 formed at a right portion of the oven door 100 at a front view. The upper fixture 220 formed at a left portion of the oven door 100 has the same shape and is coupled in the same way.

[0051] The spacer 222 is formed on the portion of the upper fixture 220 contacting the front glass 120. A stopper 224 and a

2007201803 23 Apr 2007

guide projection 226 are formed behind the spacer 222, that is, toward the rear glass 180.

[0052] As described above, the spacer 222 is inserted into the through-hole 150 illustrated in FIG. 4. The spacer 222 has a short tube shape. Referring to FIG. 6, the spacer 222 upwardly protrudes from a top surface of the upper fixture 220. The top surface contacts the front glass 120. The stopper 224 downwardly protrudes from a bottom surface of a left bending portion of the upper fixture 220, that is, an opposite surface of the top surface.

[0053] The stopper 224 restricts the assembly position of the space-ensuring member 500 described below. The stopper 224 contacts a right surface of the space-ensuring member 500 to prevent the space-ensuring member 500 from being pushed out toward right at the front view.

[0054] In addition, the guide projection 226 is formed at a right side of the stopper 224 at the front view. Referring to FIG. 6, the guide projection 226 downwardly protrudes more than two times than the stopper 224 does.

[0055] The guide projection 226 restricts the position of the

2007201803 23 Apr 2007

top shield member 400 described below. The guide projection 226 contacts the end of a top surface of the top shield member 400 to prevent the top shield member 400 from being upwardly released.

[0056] The upper fixture 220 is attached by applying a silicon to a top surface of the left bending portion of the upper fixture 220, that is, the surface from which the spacer 222 protrudes, and then by inserting the spacer 222 into the through-hole 150 in the front glass 120.

[0057] The door handle 122 is attached to the front glass 120 by putting the door handle 122 on the spacer inserted into the through-hole 150, and then by assembling the door handle 122 using a coupling member such as a screw "s".

[0058] FIG. 8 is a partial perspective view illustrating the top shield member 400 and the middle frame 240 coupled to the upper fixture 220, and the reversed top cover 300 of the oven door 100 according to an embodiment of the present invention.

[0059] Referring to FIG. 8, the top cover 300 has a length corresponding to the distance between the upper fixtures 220 formed at the left and right portions of the front glass 120. A plurality of projections upwardly protrude from both sides of the

2007201803 23 Apr 2007

top cover 300. In addition, the projections include a coupling portion 320 and a guide portion 340. The coupling portion 320 is coupled to the top cover 300 by a screw. The guide portion 340 upwardly protrudes with having inwardly a predetermined distance from the coupling portion 320.

[0060] The coupling portion 320 upwardly protrudes from both sides of the top cover 300. A through-hole 322 is further formed in the coupling portion 320.

[0061] The guide portion 340 having a half-length of that of the coupling portion 320 upwardly protrudes. The guide portion 340 contacts an upper portion of the space-ensuring members 500 when assembled.

[0062] In addition, the top shield member 400 is fit to an upper end of the heat-resisting glass 160. Both ends of the top shield member 400 contact the guide projection 226 of the upper fixtures 220. An upper end of the top shield member 400 contacts a bottom surface of the space-ensuring member 500 to be fixed.

[0063] Meanwhile, the lower fixture 260 is fixed to lower both ends of the front glass 120.

[0064] FIG. 9 is a partial perspective view illustrating the

2007201803 23 Apr 2007

lower fixture 260 coupled to the front glass 120 of the oven door 100 according to an embodiment of the present invention. Referring to FIG. 9, a bottom surface of the lower fixture 260 is approximately flat. A large projection and a plurality of small projections upwardly protrude from the bottom surface.

[0065] In detail, a fixing projection 261 and two guide projections 265 are formed on the bottom surface of the lower fixture 260. The fixing projection 261 protruding highest is coupled to the middle frame 240. The guide projection 265 protrudes with having one-tenth length of the fixing projection 261.

[0066] The fixing projection 261 has a shape similar to "┤" at a top view. A rear projection 262 vertically protrudes from the bottom surface of the lower fixture 260. A side projection 263 horizontally protrudes from a lower middle portion of the rear projection 262 to an upper middle portion of the rear projection 262. The rear projection 262 and the side projection 263 are formed to be a single element. In addition, the fixing projection 261 is inserted into a rear insert groove 245 and a side insert groove 247, so that the middle frame 240 and the

2007201803 23 Apr 2007

lower fixture 260 are coupled to each other. The rear and side insert grooves 245 and 247 are formed on the middle frame 240 which will be described below in detail.

[0067] The guide projection 265 upwardly protruding has a small distance from the right side of the fixing projection 261. The two guide projections 265 having the same height have a distance from each other. The distance is slightly larger than the thickness of the division members 170, that is, the middle glass 140 and the heat-resisting glass 160, so that the division members 170 can be inserted, respectively.

[0068] A plurality of guide holes 264 are formed in the lower fixture 260 by the guide projection 265. The guide holes 264 are divided by the guide projection 265. The middle glass 140 is inserted into the most rear space.

[0069] In addition, the heat-resisting glass 160 is inserted in a space formed in front of the middle glass 140. The rear glass 180 is inserted in a space formed in front of the heat-resisting glass 160.

[0070] Therefore, the outer bracket 266 shields a front side of a space in which the rear glass 180 is placed, so that the

2007201803 23 Apr 2007

rear glass 180 is guided to be inserted.

[0071] Meanwhile, the middle frame 240 is coupled to an upper portion of the lower fixture 260.

[0072] FIG. 10 is a cross sectional view illustrating the disposition of the middle frame 240 of the oven door 100 according to an embodiment of the present invention.

[0073] Referring to FIG. 10, the middle frame 240 has a shape similar to "┣". The middle frame 240 includes a coupling portion 244, a shield portion 242, and an opening portion 246. The coupling portion 244 coupled to the rear projection 262 forms a middle portion of the middle frame 240. The shield portion 242 is extended under the coupling portion 244 and contacts the rear glass 180 to shield a side of a space between the rear glass 180 and the heat-resisting glass 160. The opening portion 246 is extended over the coupling portion 244 and contacts the fixing projection 261.

[0074] A right portion of the coupling portion 244 has a shape similar to "U", so that the whole sides are closed except for a top side. Therefore, the right portion of the coupling portion 244 forms the rear insert groove 245 fit to the fixing

2007201803 23 Apr 2007

projection 261 of the lower fixture 260. In addition, a left portion of the coupling portion 244 has a shape similar to "C" and forms a main body of the middle frame 240.

[0075] The shield portion 242 is downwardly extended from a bottom surface of the left portion of the coupling portion 244 with a gentle slope, and then is bended to the right. The shield portion 242 has a shape similar to "L".

[0076] The shield portion 242 contacts the rear glass 180. The shield portion 242 and the coupling portion 244 shield the side of the space between the rear glass 180 and the heat-resisting glass 160 with the coupling portion 244.

[0077] The opening portion 246 having a shape similar to "L" is extended over the left portion of the coupling portion 244. In addition, the side insert groove 247 fit to the side projection 263 is formed between the opening portion 246 and the coupling portion 244.

[0078] FIG. 11 is a cross sectional view illustrating the upper fixture 220 coupled to the middle frame 240 according to an embodiment of the present invention, and FIG. 12 is a cross sectional view illustrating an assembly of the middle frame 240,

2007201803 23 Apr 2007

and the rear and side projection 262 and 263 of the lower fixture 260 according to an embodiment of the present invention.

[0079] Referring to FIG. 12, a side-sealing member 280 illustrated in dotted lines is formed between the middle frame 240 and the middle glass 140. The side-sealing member 280 is a tube formed of an elastic material, which has the same length as the middle frame 240 and is inserted between the middle frame 240 and the middle glass 140.

[0080] Referring to FIGS. 10 and 12, only the space between the rear glass 180 and the heat-resisting glass 160 and the space between the heat-resisting glass 160 and the middle glass 140 are sealed by the side-sealing member 280 and the middle frame 240. The space between the middle glass 140 and the front glass 120, that is, the side of the space contacting the front glass 120 is not sealed.

[0081] This is an important technology. The inner heater 10 is effectively insulated by the two spaces near the rear glass 180.

[0082] In the structure of the oven door 100, the whole temperature of the oven door 100 may increase too high.

2007201803 23 Apr 2007

According to the present invention, the side of the space contacting the front glass 120 is open as illustrated in FIG. 12 so as to prevent the front glass 120 and the door handle 122 from being too hot. Users can touch the front glass 120 and the door handle 122 contacting the front glass 120.

[0083] Referring to FIG. 12, air introduced from the bottom of the oven door 100 to the space contacting the front glass 120 can go out through a side opening when heated.

[0084] Therefore, when a user touch the door handle 122 or the front glass 120 after a long cooking, the user is safe from getting a burn.

[0085] Hereinafter, functions of the various parts will be described while assembling the oven door 100 with reference to FIGS. 3 and 4.

[0086] In an assembly process of the oven door 100 according to the present invention, the door handle 122 is first attached. Silicon is applied to the top surface of the upper fixture 220, that is, the surface from which the spacer 222 protrudes so as to attach the door handle 122. After that, the spacer 222 is inserted to the through-hole 150 in the front glass 120 to fix

2007201803 23 Apr 2007

the upper fixture 220 to the front glass 120.

[0087] In here, the spacer 222 has a height corresponding to the thickness of the front glass 120. The spacer 222 has a diameter slightly smaller than that of the through-hole 150.

[0088] In addition, the spacer 222 having a tube shape has the height corresponding to the thickness of the front glass 120.

[0089] After the upper fixture 220 is attached to the rear surface of the front glass 120, the door handle 122 is placed on the front surface of the front glass 120 with the screw hole 124 being aligned with the through-hole 150. In addition, the screw "s" goes through the spacer 222 in the front glass 120 rotating in clock wise direction, so that the screw "s" is coupled to the screw hole 124 to couple the door handle 122 to the front glass 120.

[0090] The spacer 222 and the upper fixture 220 form a single element to disperse the torque by the screw "s" along the whole upper fixture 220. The upper fixture 220 is coupled to the door handle 122 by the screw "s" with the front glass 120 being between the upper fixture 220 and the door handle 122.

[0091] After that, the lower fixture 260 is fixed to the

2007201803 23 Apr 2007

lower both ends of the front glass 120. The lower fixture 260 is fixed having a vertical distance from the upper fixture 220, the distance being the length of the middle frame 240. In addition, the lower fixture 260 is strongly fixed to the lower portion of the front glass 120 with silicon being applied to a rear surface of the lower fixture 260. In addition, a screw can be used for stronger attachment.

[0092] The middle frame 240 is formed between the upper and lower fixtures 220 and 260. The middle frame 240 is coupled with the fixing projection 261 formed on the lower fixture 260 being inserted into the rear insert groove 245 without a screw or sealant.

[0093] After the upper and lower fixtures 220 and 260 and the middle frame 240 are fixed to the front glass 120, a lower portion of the middle glass 120 is slantly inserted into the guide hole 264 formed in the lower fixture 260, and then an upper portion of the middle glass 120 is pushed down until the middle glass 120 is parallel with the front glass 120. In addition, the space-ensuring member 500 is inserted between the upper fixture 220 and the shield member 400.

2007201803 23 Apr 2007

[0094] Meanwhile, the side-sealing member 280 is inserted between the middle glass 140 and the middle frame 240. The side-sealing member 280 firmly fixes the middle glass 140 and the middle frame 240 as well as seals between the middle glass 140 and the middle frame 240.

[0095] The heat-resisting glass 160 is inserted in the same way as the middle glass 140.

[0096] In here, the space-ensuring member 500 is located between the middle glass 140 and the heat-resisting glass 160 to form the space. The middle glass 140 and the heat-resisting glass 160 are firmly fixed by the space-ensuring member 500. Therefore, the space-ensuring member 500 prevents the middle glass 140 and the heat-resisting glass 160 from being damaged by impact.

[0097] After the heat-resisting glass 160 is inserted, the top shield member 400 is fit to the heat-resisting glass 160. The top shield member 400 shields and insulates an upper side of the space between the heat-resisting glass 160 and the rear glass 180.

[0098] In addition, the impact absorption material 420 formed

2007201803 23 Apr 2007

at the both ends of the top shield member 400 is formed of an elastic material and contacts the guide projection 226 of the upper fixtures 220.

[0099] When the top shield member 400 is formed of a metal, the impact absorption material 420 prevents the edge of the top shield member 400 from scratching the heat-resisting and middle glasses 160 and 140.

[00100] After the top shield member 400 is fit, the rear glass 180 is placed behind the heat-resisting glass 160. In addition, the top cover 300 is located over the rear glass 180 to fix the rear glass 180.

[00101] In here, the guide portion 340 formed on both end portions of the top cover 300 contacts the upper portion of the space-ensuring members 500 to fix the space-ensuring members 500. Simultaneously, the guide portion 340 pushes down and fixes the top shield member 400. In addition, the guide portion 340 fixes the middle and heat-resisting glasses 140 and 160 since the space-ensuring members 500 and the top shield member 400 are coupled to the middle and heat-resisting glasses 140 and 160.

[00102] In addition, the coupling portion 320 formed on the

2007201803 23 Apr 2007

both end portions of the top cover 300 is coupled to the upper fixture 220 by a screw to obtain the oven door 100.

[00103] The door frame is formed of the various parts. Therefore, when the middle frame 240 is damaged, only the middle frame 240 is replaced. As matter of course, the upper and lower fixtures 220 and 260 are individually replaced.

[00104] In the oven door 100, air is introduced from the bottom of the oven door 100 and then is heated by a heat conduction and a radiation when the oven operates. The air goes out through only the side of the space between the front glass 120 and the middle glass 140 generated by the middle frame 240 of the rear glass 180.

[00105] That is, the space between the rear glass 180 and the heat-resisting glass 160 is closed, and the space between the front glass 120 and the middle glass 140 is opened when considering the shape and the assembly position of the middle frame 240. Therefore, the air introduced from the bottom of the oven door 100 goes out through only the side of the space contacting the front glass 120.

[00106] An air introduction passage formed under the oven door

2007201803 23 Apr 2007

100 is connected to the spaces contacting the front and rear glasses 120 and 180. However, when an inner air is heated, the space contacting the rear glass 180 has no air outlet and thus is actually closed.

[00107] Referring to FIG. 3, the other parts except for the lower fixture 260 strongly attached to the front glass 120 are not under serious loads. Therefore, the other parts except for the lower fixture 260 and the front glass 120 are easily disassembled by unscrewing the screw "S" of the upper fixture 220.

[00108] In addition, according to the spirit and scope related to the assembly position of the characteristic middle frame 240 of the present invention, the middle frame 240 is very close to the rear glass 180 or actually contacts the rear glass 180 and relatively distant from the front glass 120. Therefore, air introduced from outside goes out through the space between the front glass 120 and the middle frame 240 to cool the front glass 120. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the spirit and scope related to the assembly position of the middle frame 240. According to the broader spirit and scope

2007201803 23 Apr 2007

of the present invention, the air introduction passage formed under the oven door 100 is connected to the spaces contacting the front and rear glasses 120 and 180 and has no additional parts. Therefore, air introduced from outside is heated in the oven door 100, and then goes out through the space contacting the front glass 120. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the broader spirit and scope of the present invention.

[00109] As described above, the oven door according to the present invention includes the division members and the rear glass. The division members and the rear glass are easily coupled by the door frame, the space-ensuring member, and the top cover without additional brackets.

[00110] The air introduced from the bottom of the oven door goes out through the space between the middle frame and the front glass, and thus effectively cools the front glass.

[00111] The door frame including three parts is partially replaced when damaged. The shield frame for insulating is formed of a metal so that the thermal deformation of the shield frame is

2007201803 23 Apr 2007

reduced.

[00112] The spacer is used without an additional impact absorption washer when the door handle is coupled to the front glass. The spacer and the upper fixture form a single element to disperse the torque by the screw. Therefore, the front glass is not damaged, and the work effect for the assembly and the repair is improved. In addition, the problem of missing washers does not happen.

[00113] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. For example, the spacer formed the upper fixture and the through-hole of the front glass may have a tetragonal shape. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

31

2007201803 03 Jun 2009

What is claimed is:

1. An oven door comprising:

a front glass that defines an exterior side of the oven door;

a rear glass that defines an interior side of the oven door;

a plurality of division members arranged at predetermined intervals between the front glass and the rear glass;

a middle frame provided at opposite lateral sides of the plurality of division members, wherein the middle frame is spaced apart from the front glass and encloses the lateral sides of the plurality of division members and the rear glass;

first and second lower fixtures attached to lower left and right sides, respectively, of the front glass, wherein the first and second lower fixtures hold and support the division members and the rear glass;

a top cover that extends across a top of the front and rear glasses and the plurality of division members;

first and second upper fixtures attached to upper left and right sides of the front glass, wherein the first and second

2007201803 03 Jun 2009

upper fixtures operate to maintain a separation distance between the division members; and

a door handle coupled to the first and second upper fixtures by fasteners that pass through the front glass.

2. The oven door according to claim 1, further comprising:

a top shield member coupled to the first and second upper fixtures, wherein the top shield member seals top edges of the division members; and

a space-ensuring member that maintains a separation distance between the division members.

3. The oven door according to claim 1 or claim 2, wherein the first and second upper fixtures further comprises spacers that go through the front glass and that contact the door handle.

4. The oven door according to claim 3, wherein the spacers have a tube shape with a height equal to or larger than a thickness of the front glass, the spacers having a diameter that increases when pressed in a longitudinal direction.

2007201803 03 Jun 2009

5. The oven door according to any one of claims 1 to 4, wherein one of the door handle and the first and second upper fixtures has an area contacting the front glass, the area being sufficiently larger than an area of the front glass through which the fasteners pass.

6. The oven door of any one of claims 1 to 5, wherein the top cover completely surrounds upper surface portions of the front and rear glasses and side end portions of the upper surface portions.

7. The oven door of any one of claims 1 to 6, wherein the first and second lower fixtures completely surround lower side end portions of the rear glass and the division members.

8. The oven door of any one of claims 1 to 7, further comprising side-sealing members inserted between one of the division members and the middle frame.

2007201803 03 Jun 2009

9. An oven door comprising:

a front glass;

a door frame coupled to a rear side of the front glass, the door frame having lateral sides that are spaced apart from the rear side of the front glass;

at least one division member attached to the door frame, wherein side edges of the at least on division member are coupled to the lateral sides of the door frame;

a top cover that covers upper portions of the front glass and the at least one division member;

an air introduction passage formed at a lower portion of the door such that external air can be introduced into a space formed between the front glass and the at least one division member;

an air outlet formed between a front glass and the door frame such that air can be emitted from the space formed between the front glass and the at least one division member; and

a door handle coupled to the door frame by fasteners that pass through the front glass.

10. The oven door according to claim 9, wherein the door

35

2007201803 03 Jun 2009

frame is coupled to the front glass by one of an adhesive material and fasteners, and wherein the at least one division member is supported by the door frame.

11. The oven door according to claim 9 or claim 10, wherein the door frame comprises first and second upper fixtures, first and second lower fixtures, and a middle frame.

12. The oven door according to claim 11, wherein the first and second upper fixtures and the first and second lower fixtures include projections that couple the fixtures to the middle frame.

13. The oven door according to any one of claims 9 to 12, further comprising side-sealing members inserted and fixed between the at least one division member and the door frame, wherein the side-sealing members seal said side edges of the at least one division member.

14. The oven door according to claim 13, further comprising a top shield member that is horizontally fixed at an upper

2007201803 03 Jun 2009

portion of the door frame to seal internal spaces formed, in part, by the at least one division member.

15. The oven door according to claim 14, wherein elastic impact absorption material is formed on ends of the top shield member, the elastic impact absorption material contacting the at least one division member and the door frame.

16. An oven, comprising:

a main body having a cooking cavity;

a heat producing element; and

a door that closes the cooking cavity, wherein the door comprises:

a heat-resisting glass that shields heat generated in the cooking cavity;

a front spaced apart from the heat-resisting glass;

a rear glass spaced apart from the heat-resisting glass;

a lower fixture coupled to a lower rear surface of the front glass, wherein lower end portions of the rear glass

2007201803 03 Jun 2009

and the heat-resisting glass are each received in the lower fixture;

an upper fixture coupled to an upper rear surface of the front glass and vertically aligned with the lower fixture

a middle frame that extends between the upper and lower fixtures, wherein the middle frame covers side edges of the heat-resisting glass and the rear glass, and wherein the middle frame is spaced from the front glass such that gaps formed between the side edges of the heat-resisting glass and the rear glass are covered by the middle frame and a gap formed between the heat-shielding glass and the front glass is exposed; and

a door handle coupled to the upper fixture by fasteners that pass through the front glass.

17. The oven according to claim 16, wherein the upper fixture comprises spacers that are inserted into holes in the front glass and which contact the door handle, the spacers having a thickness equal to or larger than that of the front glass and

2007201803 03 Jun 2009

having a diameter which increases when the spacers are pressed in a longitudinal direction.

18. The oven according to claim 17, wherein the heat resisting glass comprises:

a first heat resistant glass panel spaced apart at a predetermined interval from the rear glass; and

a middle glass panel spaced apart at predetermined intervals between the first heat resistant glass panel and the front glass, wherein the predetermined interval between the first heat resistant glass panel ad the middle glass panel is maintained by at least one spacer positioned between top edges thereof.

19. The oven according to claim 18, wherein the lower fixture comprises a plurality of projections that define a plurality of guide slots therebetween, wherein the lower end portions of the rear glass, the first heat resistant glass panel and the middle glass panel are received in the guide slots so as to maintain the predetermined intervals therebetween.

2007201803 03 Jun 2009

20. An oven door substantially as herein before described with reference to the accompanying drawings.

2007201803 23 Apr 2007

FIG.1

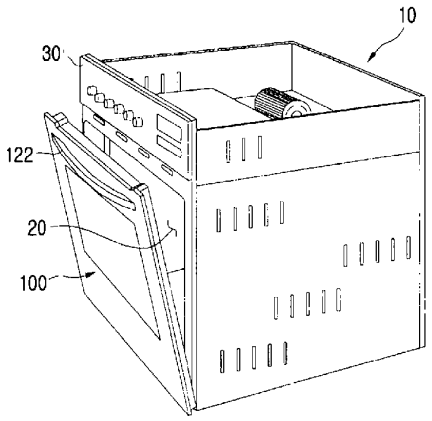
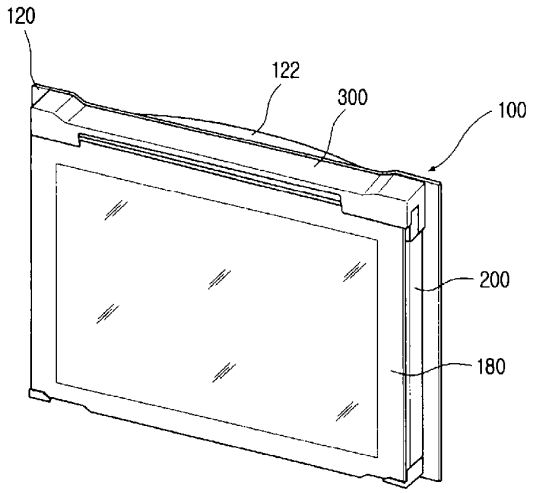
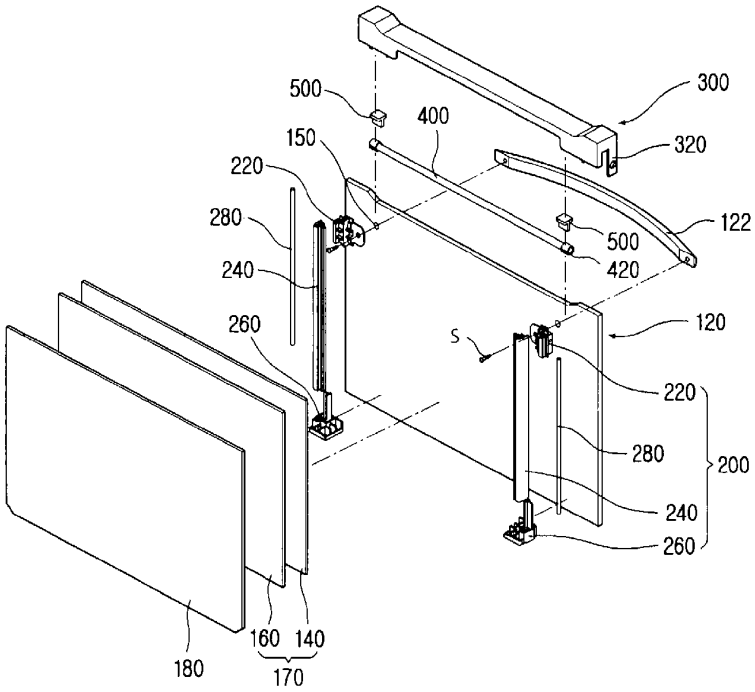


FIG.2



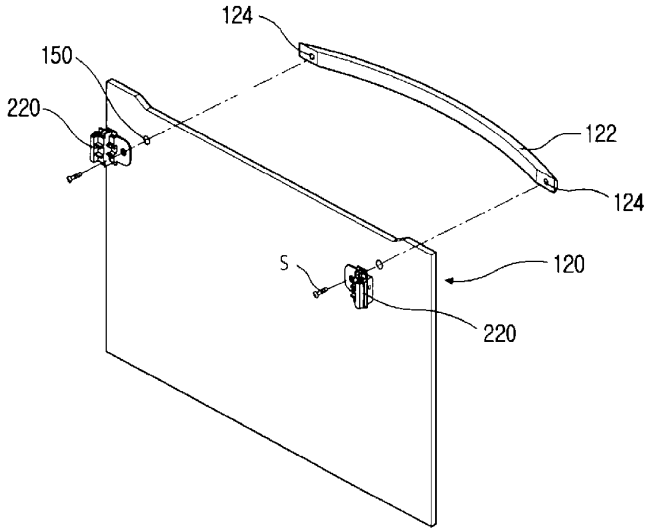
2007201803 23 Apr 2007

FIG.3



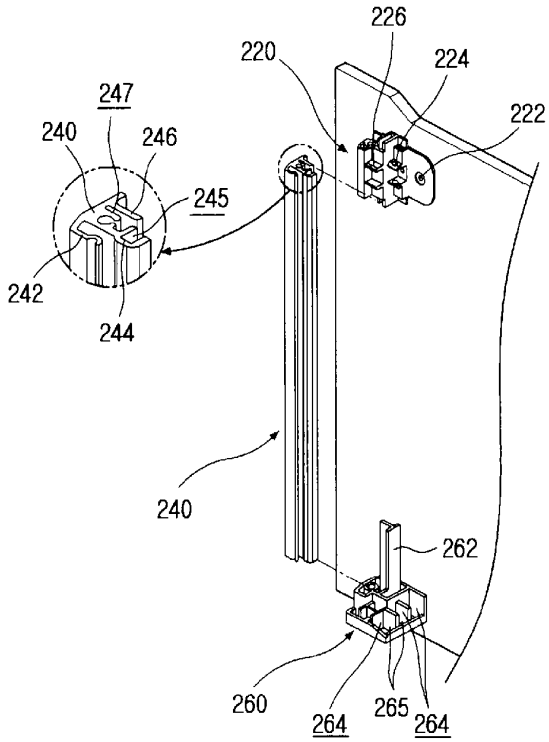
2007201803 23 Apr 2007

FIG.4



2007201803 23 Apr 2007

FIG.5



2007201803 23 Apr 2007

FIG.6

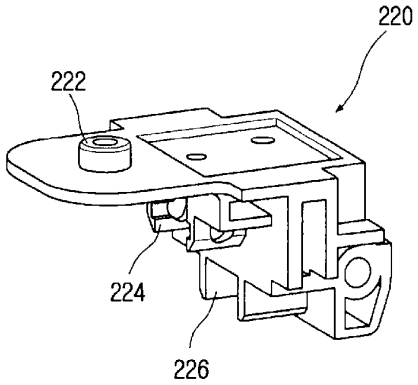
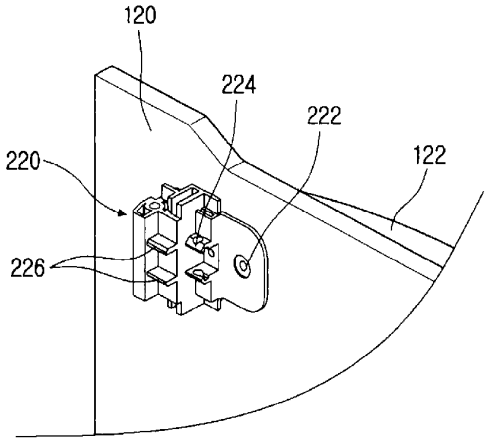


FIG.7



2007201803 23 Apr 2007

FIG.8

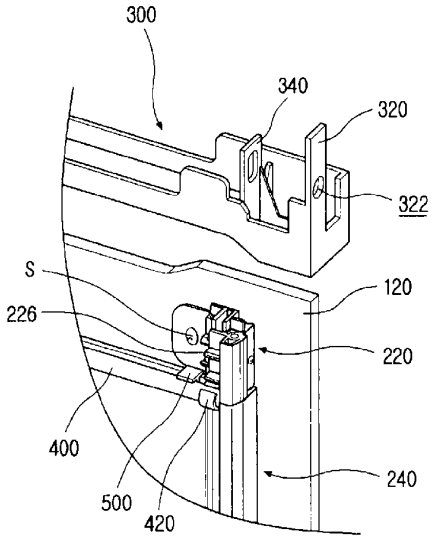
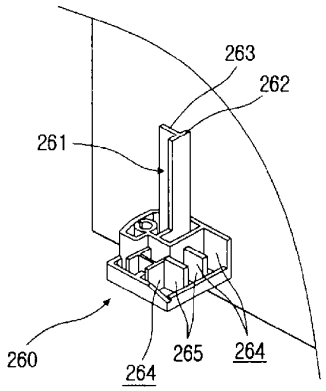


FIG.9



2007201803 23 Apr 2007

FIG.10

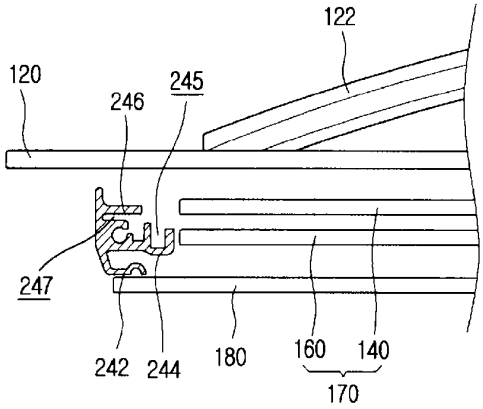
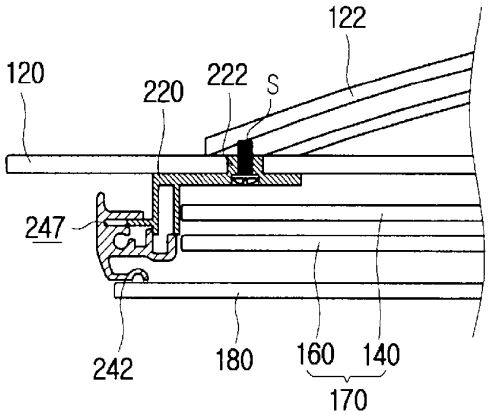


FIG.11



2007201803 23 Apr 2007

FIG.12